

REMARKS

In the Office Action, the Examiner noted that claims 13-24 are pending in the application, that claims 13, 14, 16, 17, 20, 21 and 23 stand rejected, and that claims 15, 18, 19, 22 and 24 are objected to but would be allowable if rewritten in independent form and including all of the limitations of the base claim and any intervening claims. By this response, claims 13 and 20 have been amended to more clearly define the invention of the Applicant.

The Applicant gratefully acknowledges the Examiner's indication of allowable subject matter, however, in view of the amendments presented above and the following discussion, the Applicant respectfully submits that none of these claims now pending in the application are rendered obvious under the provisions of 35 U.S.C. § 103. Thus, the Applicant respectfully submits that all of these claims are now in allowable form.

Rejections

A. 35 U.S.C. § 103

The Examiner rejected the Applicant's claims 13-14, 16-17, 20-21 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Lillevold (US Pat. No. 7,054,500). The rejection is respectfully traversed.

The Applicant submits that Lillevold fails to teach or suggest each and every element of the Applicant's claimed invention as claimed in at least the Applicant's amended claim 13.

In contrast to the invention of the Applicant, Lillevold teaches a video compression and decompression system with a post-filter to filter coding artifacts. More specifically, Lillevold teaches and claims digitally filtering a signal charged with **motion noise** with a digital filter having a plurality of filter coefficients "**for high frequency components**".... In Lillevold, filter 30 is a **digital filter** "**that filters high-frequency components, such as pulses, from the decoded video sequence 24.**" (See Lillevold, col. 8, line 15). Lillevold, in col. 8, lines 17-23, as cited by the Examiner, specifically recites that "In accordance with the present invention, the filter 30 has **a variable filter strength that depends upon the motion activity within a picture**. The filter strength can be adjusted by varying the filter coefficients of the filter 30. In one embodiment, the filter 30 may be adjusted to have one of a number of predetermined levels representing different filter strengths."

In addition, Lillevold, col. 2, lines 45-47 recites: "The filter module has a **variable filter strength** that is a function of detected motion activity within the video sequence." Furthermore, Lillevold, col. 2, lines 53-57 recites: "A **threshold detector is coupled to the activity counter and adjusts a filter strength as a function of the determined motion activity** within the decoded video sequence. The **threshold detector selectively adjusts the filter strength to one of a predetermined number of levels**" and at col. 2, lines 65-67 recites: "The **filter module has a variable filter strength that is a function of detected motion activity** within the video sequence" and at col. 2, lines 5-8 recites: "The **method categorizes each frame as a frame of high activity or as a frame of low activity and adjusts a filter strength** of a filter to filter the decoded video sequence **as a function of the motion activity.**"

However, the Applicant submits that Lillevold absolutely fails to teach or suggest "varying at least one of said filter coefficients of the filter in dependence on the video level for a current pixel" as taught in the Applicant's Specification and claimed by at least the Applicant's claim 13. That is, Lillevold does not even mention the video level of the moving object, which means that Lillevold in any case of detected motion activity within the video sequence, *independent, whether the moving object is a dark or bright*. *one* applies a digital filter "that filters high-frequency components". Such a process is recommended by **Lillevold** due to the fact that an image coding process, e.g. DCT, is applied on images to be transmitted and resulting DCT coefficients (in the frequency domain) are quantized, so that motion causes coding artifacts as "mosquito artifacts" "that appear around objects which are moving within a decompressed video sequence" or causes coding artifacts as "blocking artifacts" which "since each block is quantized separately, the errors are most visible at the block boundaries" (see col. 1, line 33 to col. 2, line 11). As such, the Applicant submits that Lillevold applies high-frequency filtering in case of motion and will not filter or apply filtering with lower strength if there is no motion.

In contrast to the teachings of Lillevold, the Applicant's invention is related at least in part to *reducing quantization error during video level signal processing and varying filter coefficients in dependence on the video level for a current pixel by stronger filtering a lower video level while less filtering or not filtering a higher video level to reduce quantization error in the lower video level*. That is, more specifically, the Applicant's independent claim 13 is directed to a "Method for reducing quantization

error during video level signal processing for a display device with digitally driven pixels, comprising:

digitally filtering a signal charged with said quantization error with a digital filter having a plurality of filter coefficients, said signal including a video level for each pixel of said display device, and varying at least one of said filter coefficients of the filter in dependence on the video level for a current pixel *by stronger filtering a lower video level for said pixel while less filtering or not filtering a higher video level for said pixel to reduce quantization error in the lower video level.*"

Independent claim 20 of the Applicant's invention is directed at least in part to a "Device for reducing quantization error during the video level signal processing for a display device with digitally driven pixels, comprising:

digital filter means for digitally filtering a video signal charged with said quantization error, said filter means having a plurality of filter coefficients, and said signal including a video level for each pixel of said display device, and

a controlling means connected to said digital filter means for varying at least one of said filter coefficients in dependence on the video level for a current pixel *by stronger filtering a lower video level for said pixel while less filtering or not filtering a higher video level for said pixel to reduce quantization error in the lower video level.*"

As such, the Applicant submits that in addition to the fact that the Applicant's invention is related to the video level, independent whether or not there is motion activity (which requires at least two pixels), also the recommended action (the strength) of the filter of the Applicant's invention is inverse to the filtering of the cited reference. More specifically:

The lower video level is stronger filtered – lower speed is less filtered.

The higher video level is less filtered – higher speed is stronger filtered.

Consequently, the Applicant submits that the Examiner's statements concerning claim 13 as pointed out in paragraph 4a, 4b at page 3 of the Office Action, at least for the following reasons, have to be withdrawn:

a) "noise" according to Lillevold is a frequency noise caused by moving objects in the picture, which are encoded into a frequency domain to reduce the bit rate and the

required bandwidth for storage and transmission and are decoded to be displayed. In contrast, "noise" according to various embodiments of the Applicant's invention identifies a level noise (quantization noise) caused by the linear display behaviour of plasma display devices and the non linear human eye response and sensitivity to brightness and luminosity – the strength of light emitted from a light source, so that a non linear transfer function is applied to the gray level to compensate said behaviour, which corresponds to the transmission function of a colour picture tube. That means that it is less random as a moving object and it is more precise to call it "quantization error during video level signal processing" as accomplished by the amended claims.

That means that the term "noise" is not precise and has a different meaning in Lillevold, so that said noise is not met by the Filter 30 of Lillevold, which is a Filter 30 "that filters high-frequency components"

b) The Applicant submits that "varying ...filter coefficients ...in dependence on the video level for a current pixel" as taught and claimed by the Applicant is not taught or suggested by the disclosure of Lillevold reciting " ..the filter 30 has a variable filter strength that depends upon the motion activity within a picture" as e.g., in addition to the above mentioned difference, "filter strength" levels, Strong ("S"), Medium ("M") or Weak ("W") according to the Applicant's invention are applied in inverse in Lillevold.

Consequently, the Applicant submits that the filter taught in Lillevold absolutely fails to teach or suggest the filter of the various embodiments of the Applicant's invention as describe above.

c) the Examiner in the Office Action concedes that "Lillevold does not specifically disclose the video level for each pixel." The Applicants further respectfully disagree with the Examiner's contention that "it would have been obvious to the skilled in the art at the time the invention was made to modify the system of frame-by-frame or micro-block processing in Lillevold into pixel-by-pixel processing" as a detection of motion activity requires at least two pixel and the video level (luminance value) of a single pixel of a picture can not be used as evidence for motion in the picture.

Consequently, as the signal feature (frequency - level), which is changed by the methods; the means applied to the feature (frequency filter- amplitude filter); the signal source for controlling (at least two pixel for moving detection – the video level of a

single pixel) and the filter strength behavior (high strength for fast mowing – high strength for low level) are different and Lillevold, col. 2, ll. 24 – 26 further reads: “an estimation of the noise power based on the quantization step size is not a reliable indicator as to the spatial location of mosquito artifacts and blocking artifacts within the decompressed video.” As such, the Applicants submits that the teachings of Lillevold fall far short of the Applicant’s claimed invention, at least with respect to amended, independent claim 13.

In the Office Action, the Examiner states: “As to claim 14 wherein said filtering includes one and/or two dimensional low pass filtering is met by the disclosure on paragraph [0009]: In order to reduce the effects of the coding artifacts, it is known to apply a post-processing technique to the recovered image. Since the artifacts typically comprise high frequency components, decoders in systems that apply such post-processing include a postprocessor having a low-pass filter to filter out those components in the recovered image.” Although it is not quite clear what is meant with “the disclosure on paragraph [0009]”, the Examiner’s statement: “artifacts typically comprise high frequency components, decoders in systems that apply such post-processing include a postprocessor having a low-pass filter to filter out those (frequency) components in the recovered image” as it is disclosed in Lillevold col. 2 ll. 24 – 30, confirms Applicant’s opinion that the known prior art neither discloses nor gives a hint to the Applicant’s invention, wherein the artifacts comprise low level independent from low or high frequency components.

Therefore and for at least the reasons recited above, the Applicant submits that Lillevold fails to teach or suggest each and every element of the Applicant’s claimed invention as claimed in at least the Applicant’s independent claims 13 and 20. As such, the Applicant submits that for at least the reasons recited above, the Applicant’s independent claims 13 and 20 are not rendered obvious by the teachings of Lillevold, and, as such, fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.

Furthermore, the Applicant’s dependent claims 14, 16-17, 20-21 and 23 depend either directly or indirectly from the Applicant’s independent claims 13 and 20, respectively, and recite additional features thereof. As such, the Applicant submits that at least because the Applicant’s claims 13 and 20 are not rendered obvious by the teachings of Lillevold, the Applicant further submits that the Applicant’s dependent

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claims 14, 16-17, 20-21 and 23, which depend either directly or indirectly from the Applicant's claims 13 and 20, are also not rendered obvious by the teachings of Lillevold, and, as such, fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.

The Applicant reserves the right to establish the patentability of each of the claims individually in subsequent prosecution.

Conclusion

Thus, the Applicant submits that none of the claims, presently in the application, are rendered obvious under the provisions of 35 U.S.C. § 103. Consequently, the Applicant believes that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

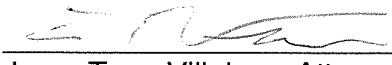
If however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, or if the Examiner believes a telephone interview would expedite the prosecution of the subject application to completion, it is respectfully requested that the Examiner telephone the undersigned.

No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account No. 07-0832.

Respectfully submitted,

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